

Claims

What is claimed is:

1. A method for performing a wire-bonding operation in an integrated circuit, utilizing a bonding tool, the method comprising the steps of:

5 ball bonding a wire to a first bond site in the integrated circuit;
forming at least one bend in the wire; and
terminating the wire at a second bond site, thereby creating a wire bond profile;
wherein the ball bonding, forming and terminating steps are repeated for a plurality of
10 additional wire bonds of the integrated circuit, and at least two wire bond profiles in the integrated
circuit are substantially perpendicular to one another at a crossing point of the profiles.

2. The method of claim 1, wherein the step of forming at least one bend in the wire
comprises the step of applying at least one reverse motion with the bonding tool.

3. The method of claim 2, wherein the step of applying at least one reverse motion comprises
the step of applying a negative reverse motion and a positive reverse motion, wherein the negative
15 reverse motion comprises moving the bonding tool vertically above the ball bond and in a first
horizontal direction toward the second bond site, and wherein the positive reverse motion comprises
moving the bonding tool vertically above the ball bond and in a second horizontal direction away
from the second bond site.

4. The method of claim 3, wherein the negative reverse motion is applied at approximately
20 0.2 mm from the first bond site along a length of the wire.

5. The method of claim 3, wherein the positive reverse motion is applied at approximately
0.6 mm from the first bond site along a length of the wire.

6. The method of claim 5, wherein the wire bond profile has a height of approximately 0.6 mm.
7. The method of claim 3, wherein the negative reverse motion is applied at approximately 1.1 mm from the first bond site along the length of the wire.
- 5 8. The method of claim 1, further comprising the steps of:
clamping the wire with the bonding tool at a desired length after forming at least one bend in the wire; and
moving the bonding tool along an arcuate path to the second bond site before terminating the wire at the second bond site.
- 10 9. The method of claim 1, wherein the step of terminating the wire at the second bond site comprises the steps of:
bonding a ball to the second bond site with the bonding tool; and
terminating the wire on a top surface of the bonded ball at the second bond site with the bonding tool.
- 15 10. The method of claim 9, wherein the wire is terminated at a die or a capacitor of the integrated circuit.
11. The method of claim 1, wherein the at least one bend prevents the wire bond profile from skewing in a direction away from the second bond site.
- 20 12. The method of claim 1, wherein the integrated circuit comprises a radio-frequency integrated circuit

13. The method of claim 1, wherein the first bond site is disposed on a capacitor and the second bond site is disposed on a die.
14. The method of claim 13, wherein the step of terminating the wire comprises terminating the wire at an angle substantially less than 90 degrees, thereby decreasing cross coupling of the wire
5 with other wires of the integrated circuit.
15. The method of claim 1, wherein the first bond site is disposed on a die and the second bond site is disposed on a capacitor.
16. The method of claim 1, wherein the first bond site is disposed on a die and the second bond site is disposed on a lead of an integrated circuit package.
- 10 17. The method of claim 16, wherein the step of terminating the wire at a second bond site comprises the step of terminating the wire with a wedge bond.
18. An integrated circuit comprising:
an integrated circuit package;
a plurality of circuit elements disposed within the integrated circuit package;
15 a plurality of wire bonds, wherein each of at least a subset of the wire bonds is ball bonded at a first bond site and terminated at a second bond site to create a corresponding wire bond profile, and wherein at least two of the wire bond profiles are substantially perpendicular to one another at a crossing point of the profiles.
19. The integrated circuit of claim 18, wherein the plurality of wire bonds comprise a first
20 wire bond set and a second wire bond set, wherein wire bond profiles of the first wire bond set are interspersed with wire bond profiles of the second wire bond set, and wherein the wire bond profiles

of the first wire bond set are substantially perpendicular to the wire bond profiles of the second wire bond set at crossing points of the wire bond profiles.

20. The integrated circuit of claim 19, wherein the plurality of wire bonds further comprises a third wire bond set and a fourth wire bond set.

5 21. The integrated circuit of claim 18, wherein the first bond site is disposed on one of the plurality of circuit elements and the second bond site is disposed on another of the plurality of circuit elements.

22. Apparatus for performing a wire-bonding operation in an integrated circuit, the apparatus comprising:

10 a bonding tool;
 a memory; and

 at least one processor, coupled to the memory, and operative to control the bonding tool to perform the steps of: (i) ball bonding a wire to a first bond site in the integrated circuit; (ii) forming at least one bend in the wire; and (iii) terminating the wire at a second bond site, thereby creating a
15 wire bond profile; wherein the processor repeats the operations for a plurality of additional wire bonds of the integrated circuit, and at least two wire bond profiles in the integrated circuit are substantially perpendicular to one another at a crossing point of the profiles.

20 23. An article of manufacture for performing a wire-bonding operation in an integrated circuit, utilizing a bonding tool, comprising a machine readable medium containing one or more programs which when executed implement the steps of:

 ball bonding a wire to a first bond site in the integrated circuit;
 forming at least one bend in the wire; and
 terminating the wire at a second bond site, thereby creating a wire bond profile;

wherein the ball bonding, forming and terminating steps are repeated for a plurality of additional wire bonds of the integrated circuit, and at least two wire bond profiles in the integrated circuit are substantially perpendicular to one another at a crossing point of the profiles.